

# GUJARAT TECHNOLOGICAL UNIVERSITY

## DIPLOMA IN INSTRUMENTATION & CONTROL

### SEMESTER- VI

Subject Name: **BIOMEDICAL INSTRUMENTATION**

Sr. No.	Subject Content	Hrs.	Pract. Hrs.
1	<b>1.0 Bio-electric Amplifiers:</b> 1.1 Bioelectricity. 1.2 Bioelectric amplifiers and their properties.	2	4
2	<b>2.0 Medical Electrodes and transducers:</b> 2.1 ECG, EEG, EMG medical electrodes. 2.2 Working Principle of following Biomedical Transducers: 2.2.1 Body Temperature transducers. 2.2.2 Blood Pressure Transducer 2.2.3 Blood Flow Transducer 2.2.4 Pulse Transducers 2.2.5 Respiration Transducer	5	6
3	<b>3.0 Electrocardiograph:</b> 3.1 The ECG waveform. 3.2 The standard lead system. 3.3 Block Diagram and working principle of ECG machine. 3.4 ECG preamplifiers 3.5 ECG machine faults and troubleshooting. 3.6 Cardiac stimulation and life support equipment- Defibrillators, Defibrillator circuits, Cardio-version Pacemaker, pacemaker classification	5	6

4	<b>4.0 Electroencephalograph:</b> 4.1 Electro-encephalography. 4.2 EEG electrodes and the 10-20 electrode placement system 4.3 EEG amplitude and frequency bands. 4.4 Block Diagram and working principle of EEG Machine.	5	6
5	<b>5.0 Medical Ultrasonic equipments:</b> 5.1 Physics of Ultrasound 5.2 Ultrasonic foetal monitors, 5.3 Echoencephalography. 5.4 Echocardiography. 5.5. Working Principle and Diagram of color Doppler ultrasound machine	5	6
6	<b>6.0 Therapeutic instruments:</b> 6.1 Working Principle & Block Diagram of electro-surgery machine 6.2 Working Principle & Block Diagram of Hemo-dialysis machine. 6.3 Principle of Electromyography, Muscle Stimulators.	5	8
7	<b>7.0 Medical Laboratory Instrumentation and Monitoring Instruments :</b> 7.1 Working Principle , Block Diagram and Applications of Blood Cell Counter, Blood pH Analyzer and Autoanalyser. 7.2 Monitoring instruments - Alarms, Respiration rate monitor, Heart beat monitor, Temperature monitor.	6	8

8	<b>8.0 Radiological Equipments.</b> 8.1 Block diagram and operation of an X-Ray machine. 8.2 Types and uses of X-Ray machines. 8.3 Introduction to Tomography and Computerised Axial Tomography (CAT) technique.	5	8
9	<b>9.0 Miscellaneous:</b> 9.1 Theory of Macroshock and Microshock, Physiological effects of Electricity on the human body. 9.2 Line Isolation Systems.	4	4
	<b>Total</b>	42	56

**NOTE:**

1. At least two visits of different hospitals is recommended as a part of Syllabus.
2. **Above are the minimum experiences required, but the college can do more experiences if possible.**

Reference Books:

1. Hand Book Of Bio-Medical Instrumentation - Khandpur, TMH
2. Bio Medical Instrumentation & Measurement - Leslie Cromwell, FJ Weibell, EA Pfeiffer PHI
3. Principle of applied Bio- Medical Instrumentation - LA Geddes & LE Baker Willey, Network